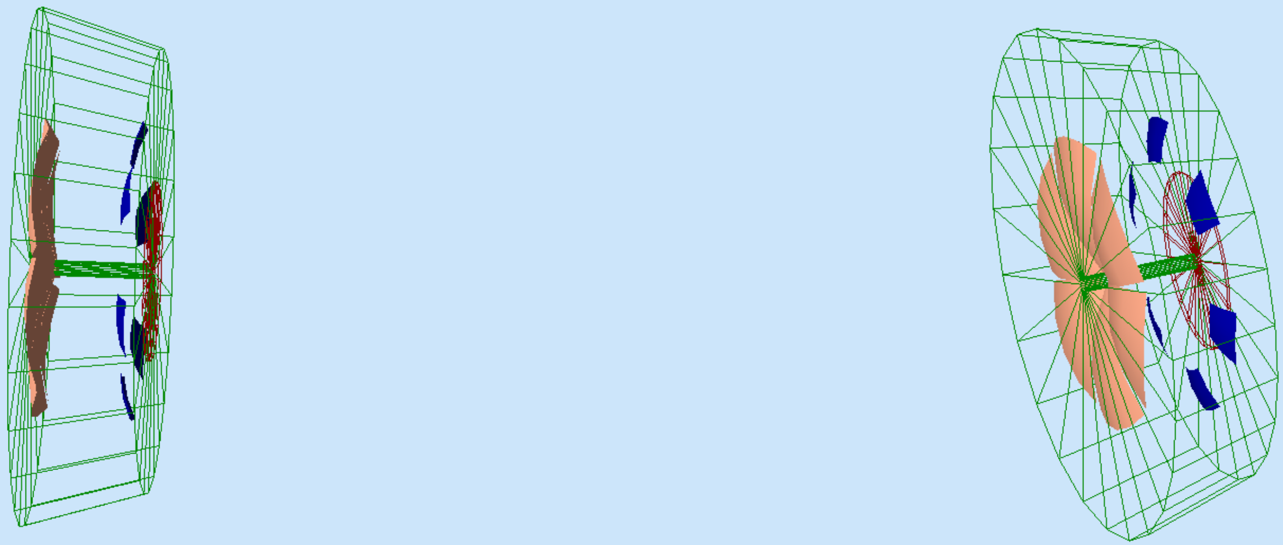
Dual-RICH update 3-28-2016
Alessio Del Dotto

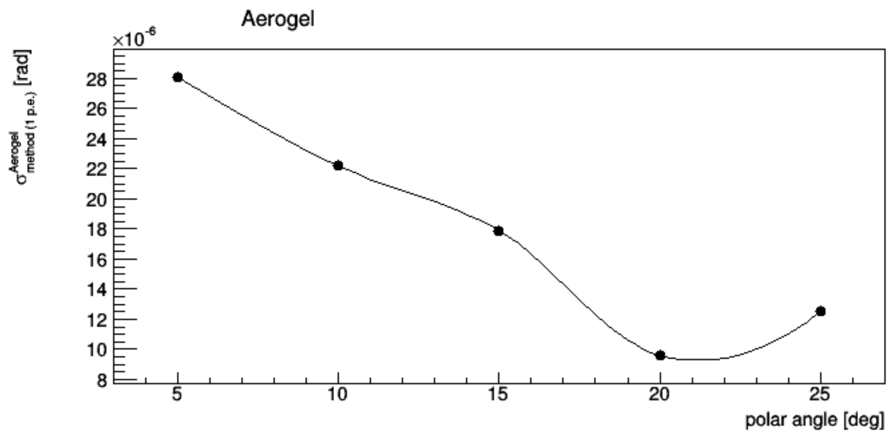
- Summary of performances
  - general R&D

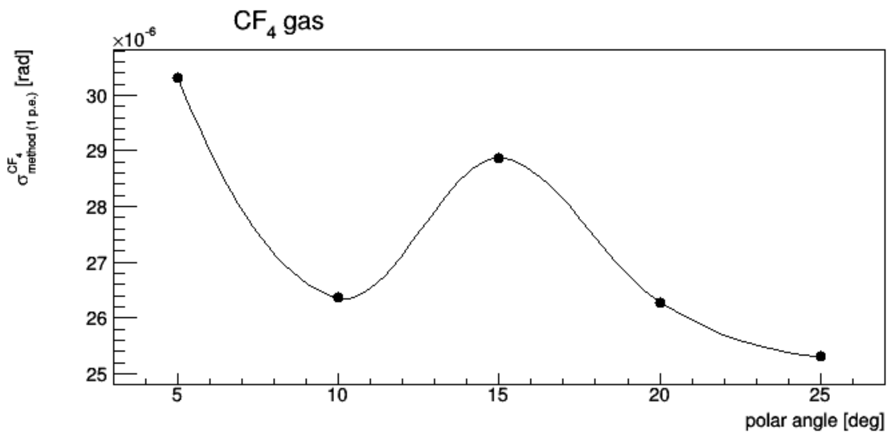
All inside the gas tank



The “real” size of the gas tank shold be set according to the space at disposal

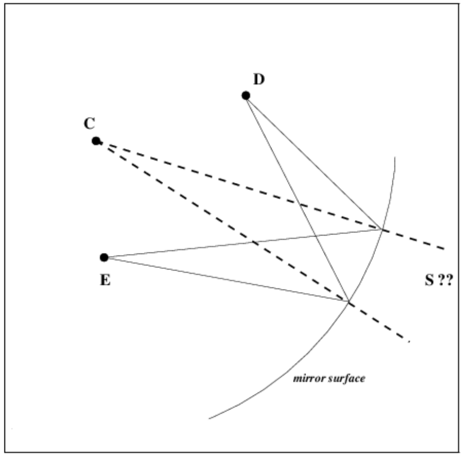
Indirect ray tracing method - resolution





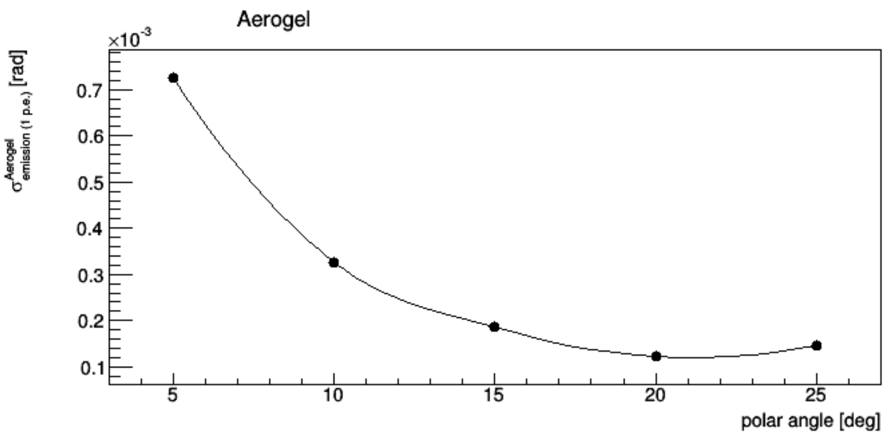
- Constant n(λ), for aerogel and gas

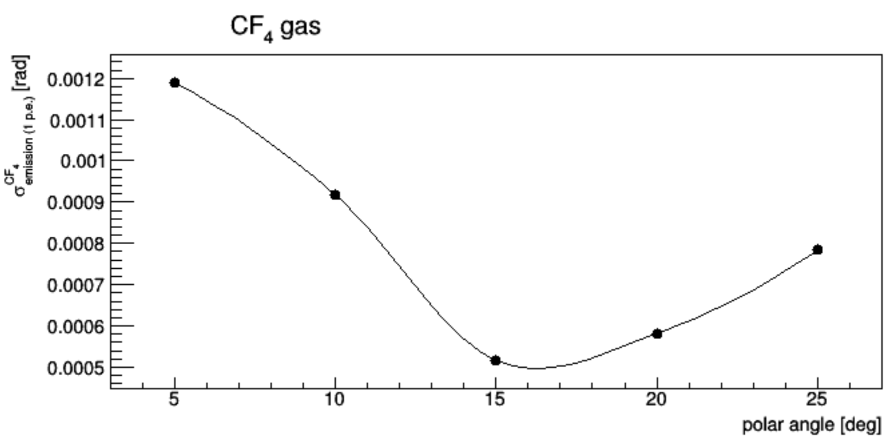
- Assuming to know the emission point, detector hit position and spherical mirror center



The recontruction method intrinsic error order 10^-5 rad

Three good configurations





Mirror radius 2.8 m
Mirror tilt angle 26.65°

At 25° 1/2 of the Aerogel photons lost to contain the size of the detector plane

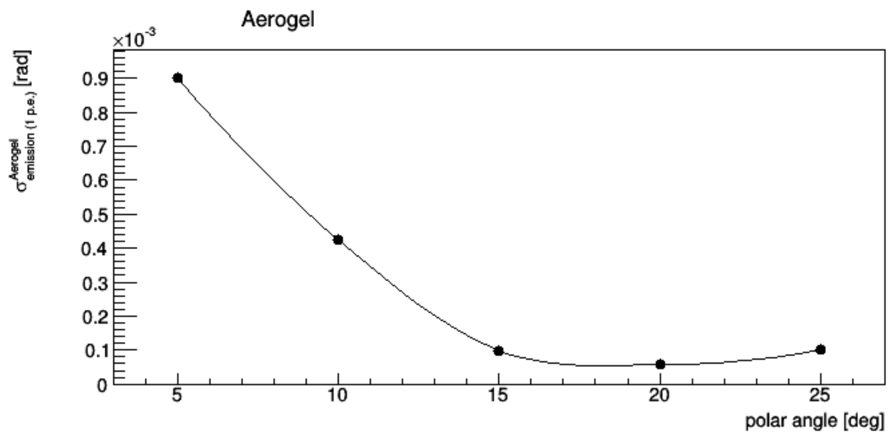
About 8500 cm^2

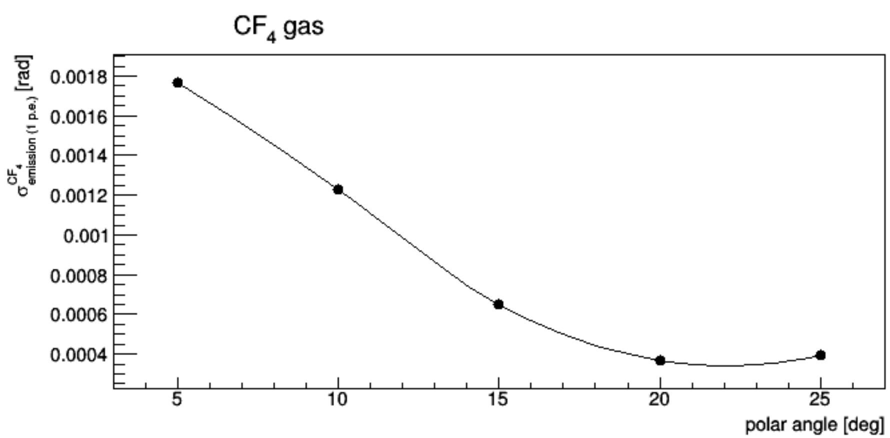
Detector plane: spherical shape

R = 1.55 m
Same center of the mirror

The emission point is assumed to be in midle point of the track in the radiator.

Three good configurations





Mirror radius 2.8 m
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At 25° 1/2 of the Aerogel photons lost to contain the size of the detector plane

About 8500 cm^2

Detector plane: spherical shape

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Same center of the mirror

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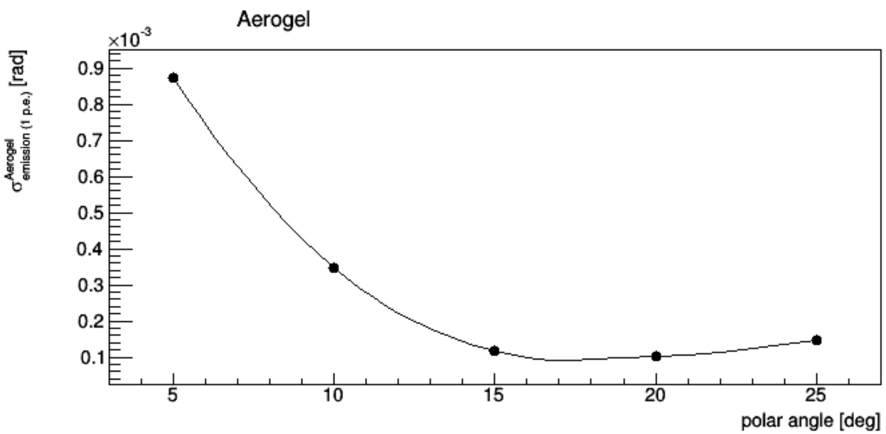
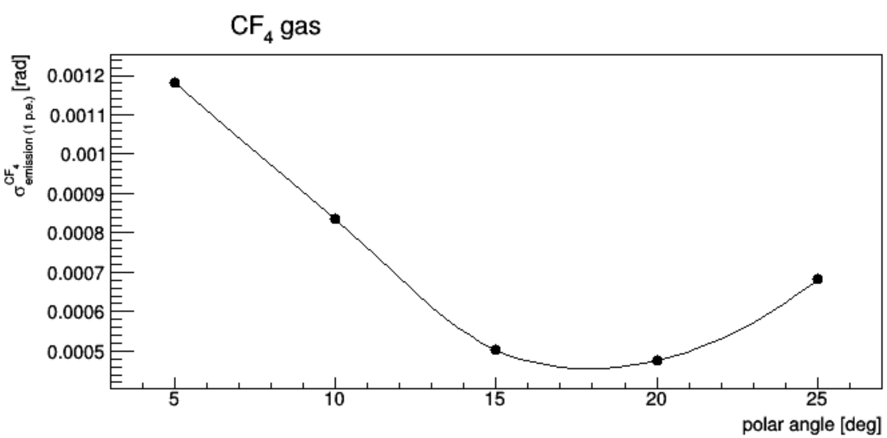
Three good configurations





Mirror radius 2.8 m
Mirror tilt angle 26.65°

At 25° 1/2 of the Aerogel photons lost to contain the size of the detector plane

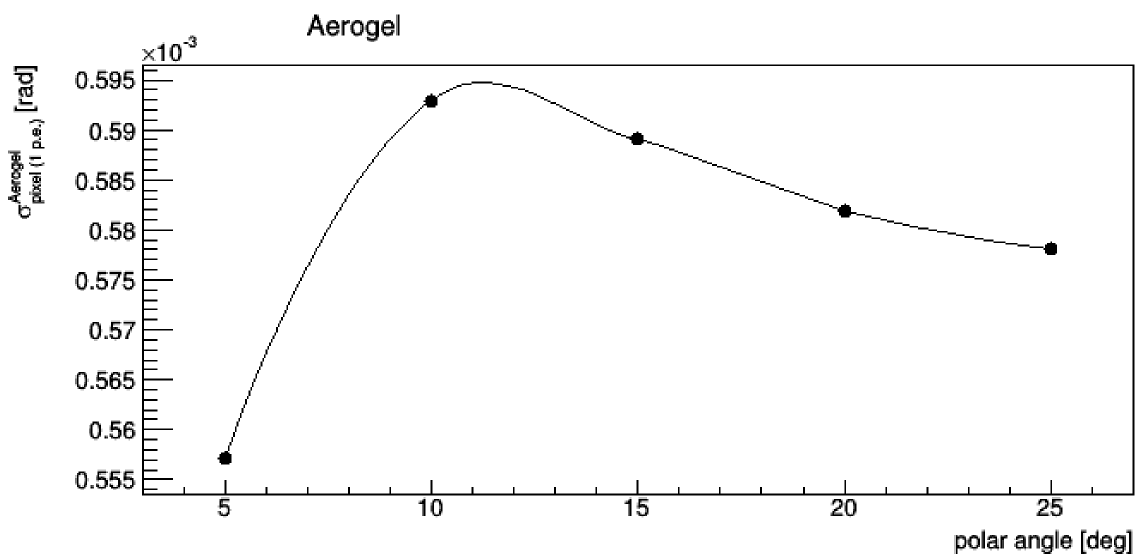
About 8500 cm^2

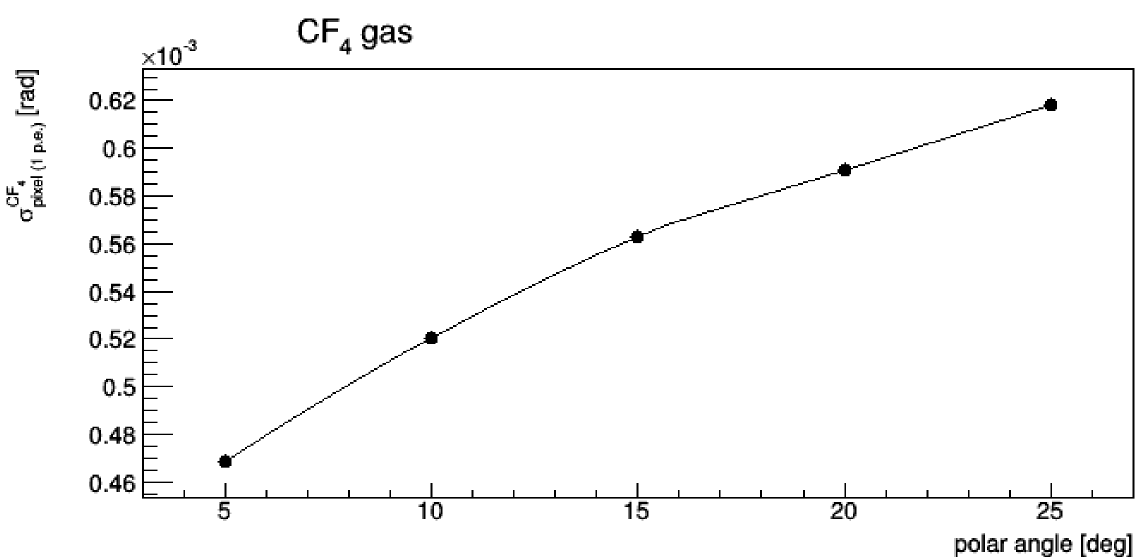
Detector plane: spherical shape

R = 1.50 m
Center shifted of 6 cm respect to the mirror center

The emission point is assumed to be in midle point of the track in the radiator.

Pixel size uncertanty



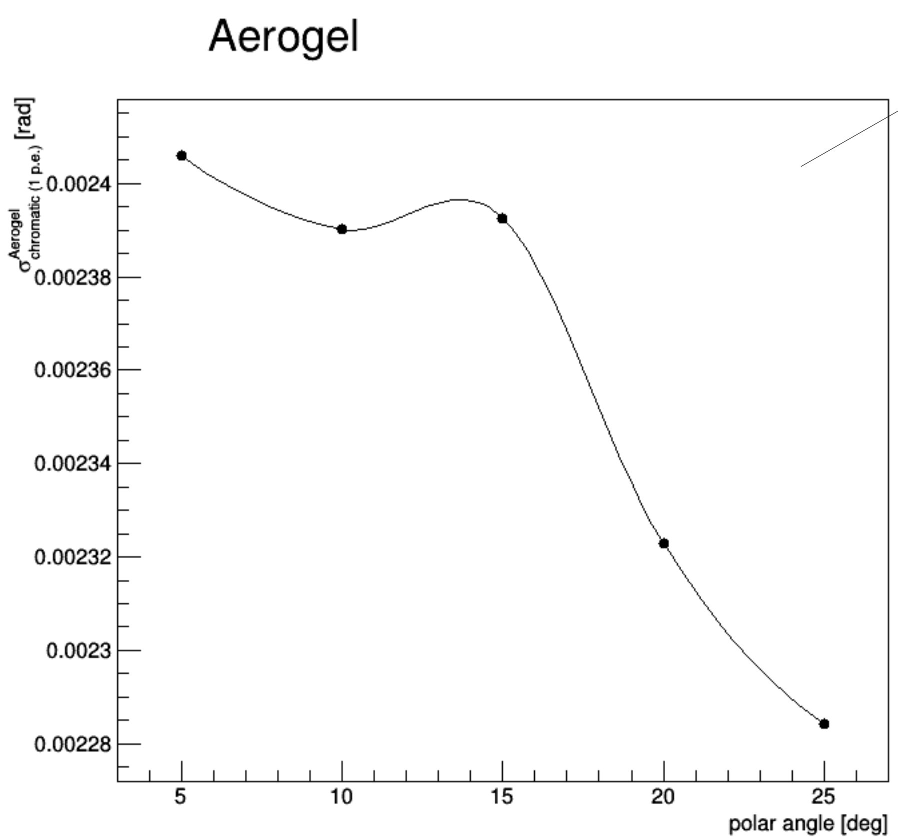


This is for squared
pixels of 3mm

In the case of spherical
Detector, perhaps different
Shapes can be better

The behavior
Is due to the different photons
Path at different polar angles

Chromatic uncertanty - aerogel



The refractions between aerogel And CF4 play a role in the indirect Ray tracing method, there is a Chromatic-refraction error which Is angular dependent.

Aerogel

$mat{"indexOfRefraction"} = "1.01963 1.01992 1.02029 1.02074 1.02128";

$mat{"photonEnergy"} = "2*eV 2.5*eV 3*eV 3.5*eV 4*eV"

CF4

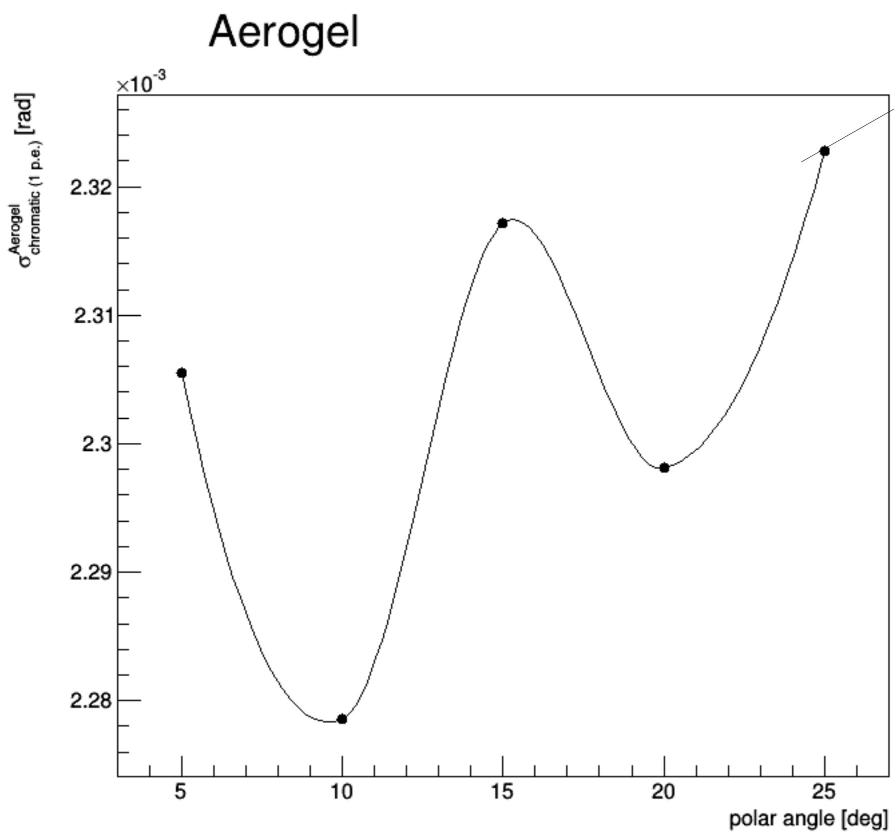
$mat{"photonEnergy"} = "2*eV 2.5*eV 3*eV 3.5*eV 4*eV 4.5*eV 5*eV 5.5*eV 6*eV 6.5*eV 7*eV";

$mat{"indexOfRefraction"} = "1.00048 1.00048 1.00049 1.00049 1.00050 1.00050 1.00051 1.00052 1.00052 1.00053 1.00054";

The recontruction method intrinsic error order 10^-5 rad

Chromatic uncertanty - aerogel

Refractive error ideally can be Corrected, but only knowing the Energy of the photons!



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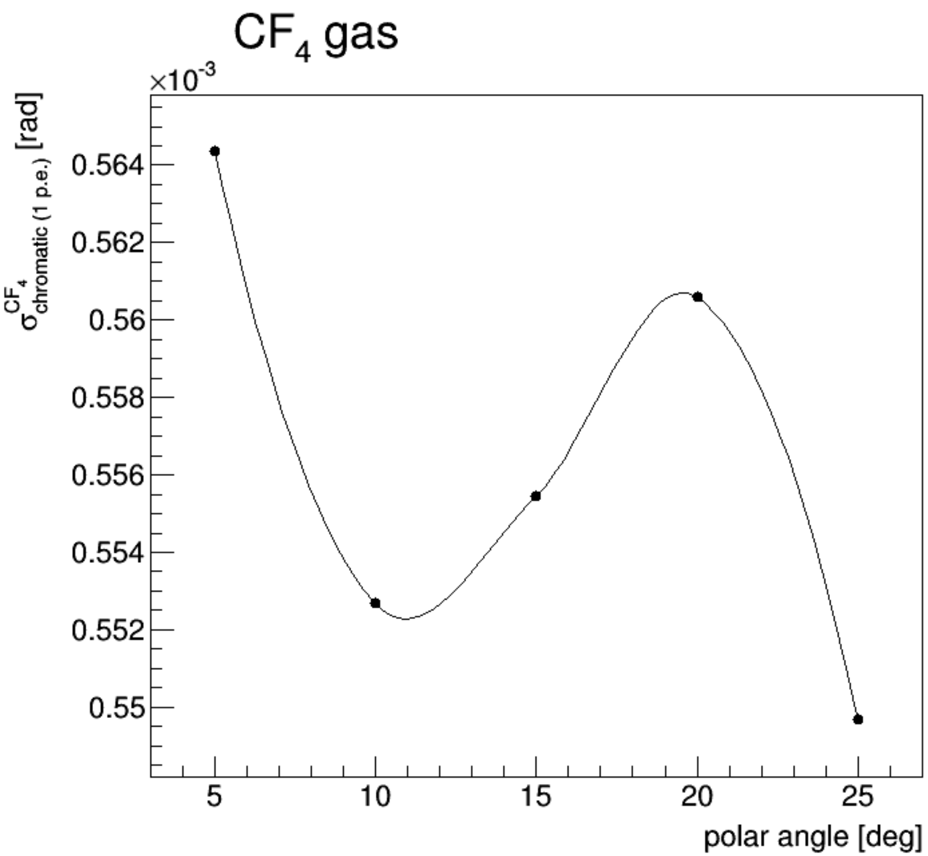
Chromatic uncertanty - CF4



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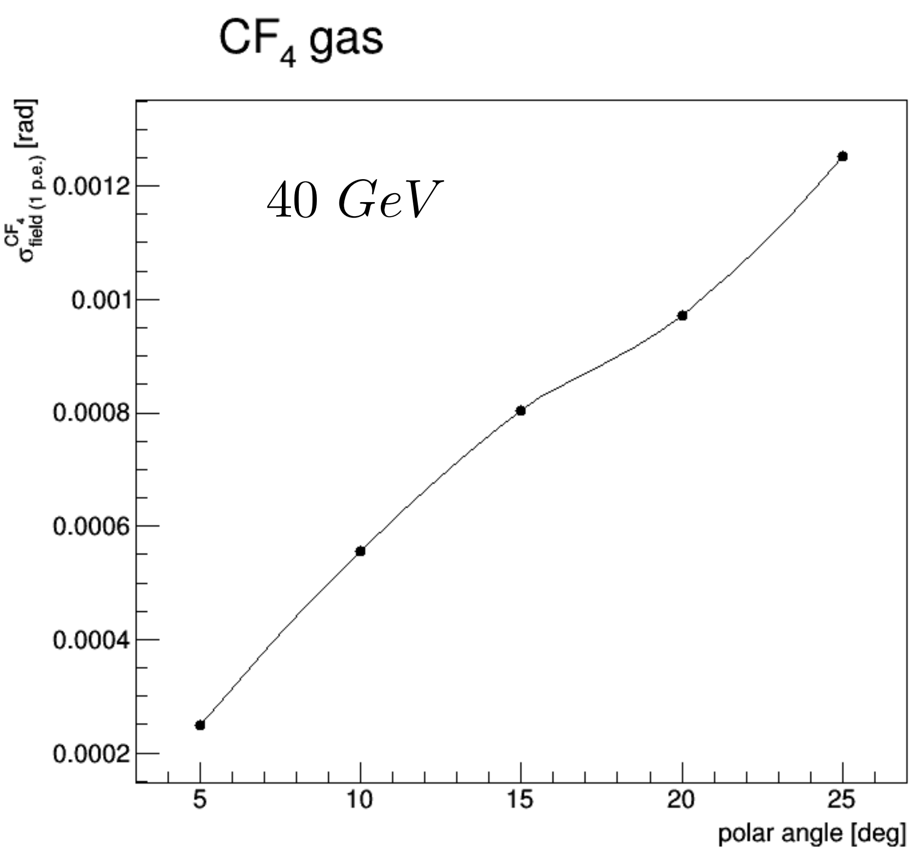
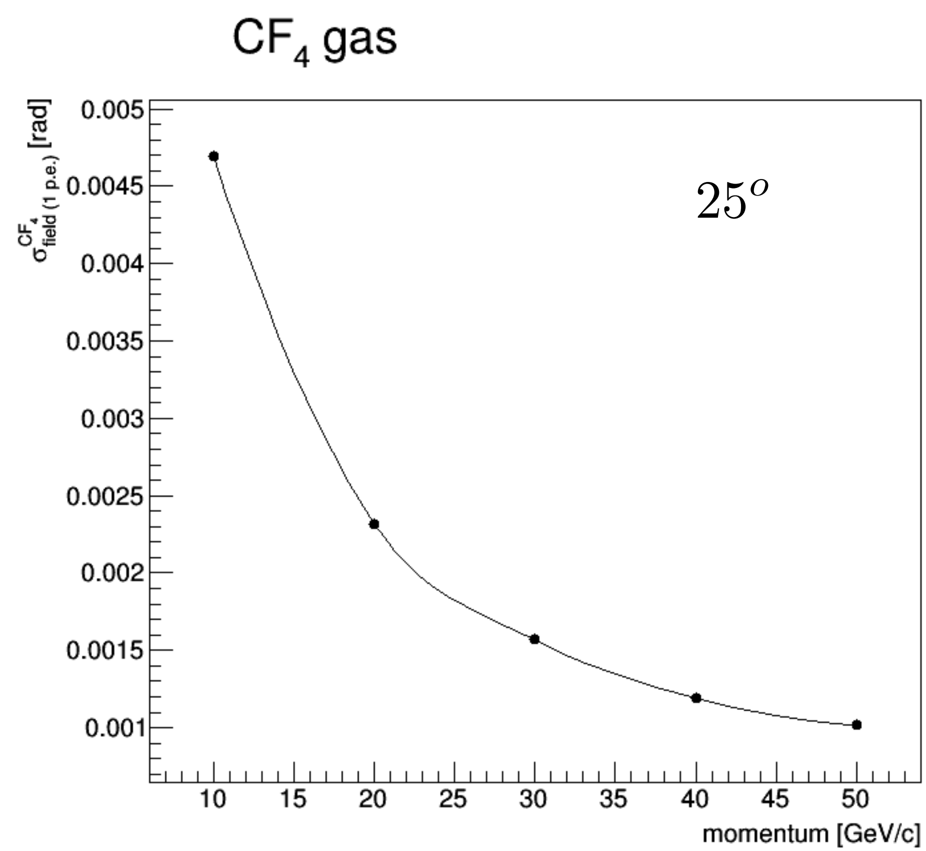
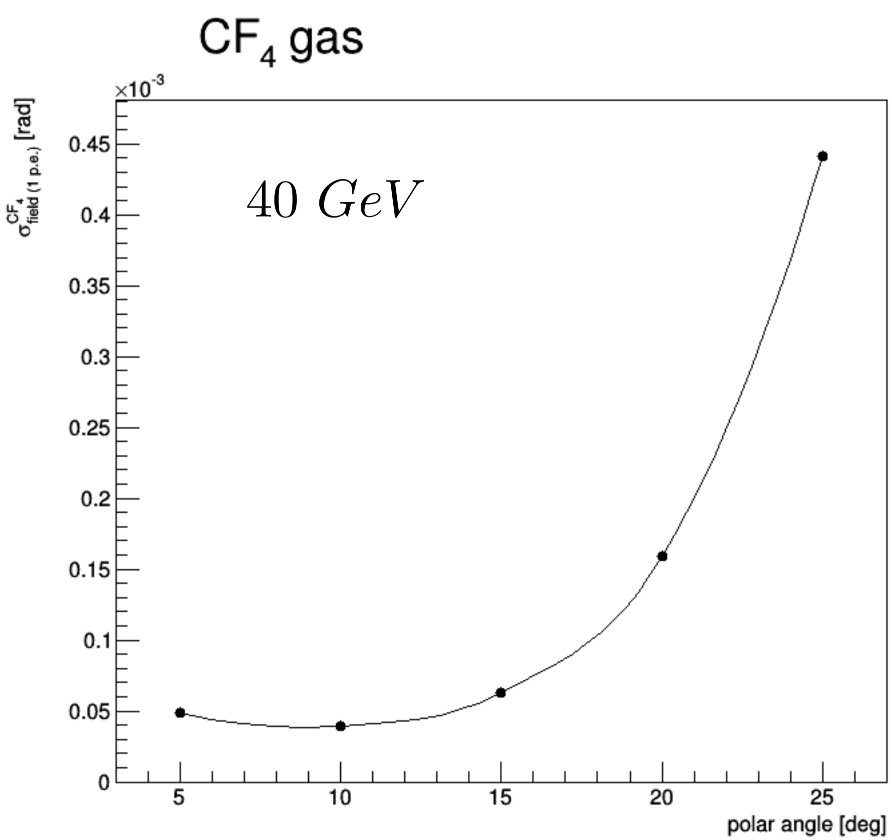
The recontruction method intrinsic error order 10^-5 rad

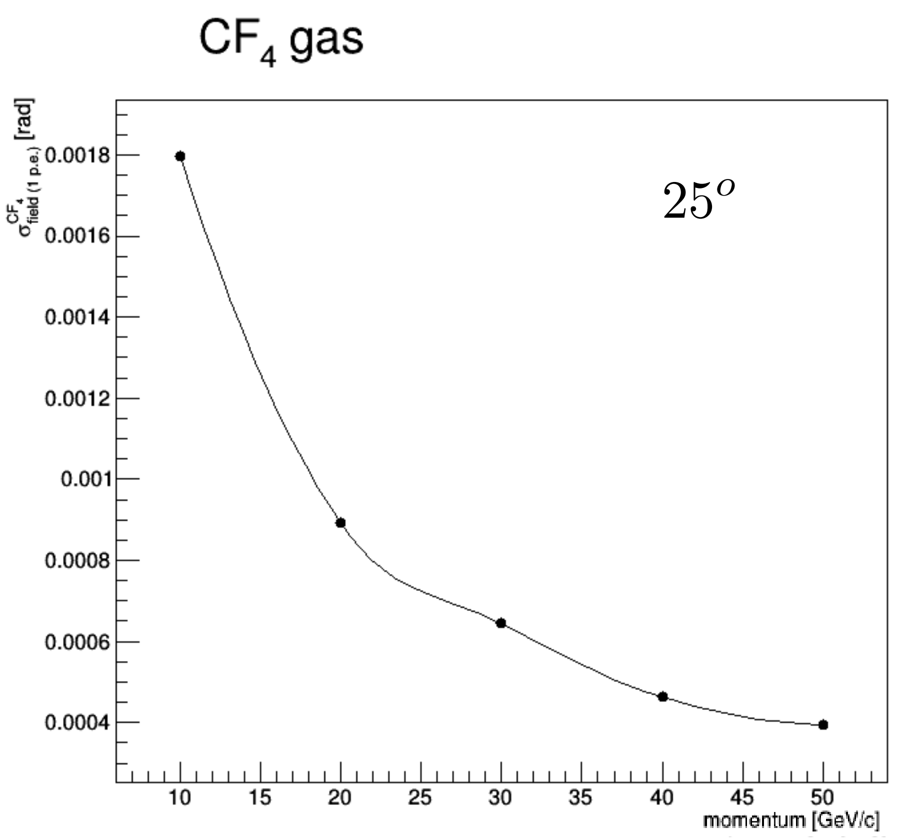
Field uncertanty – old v9



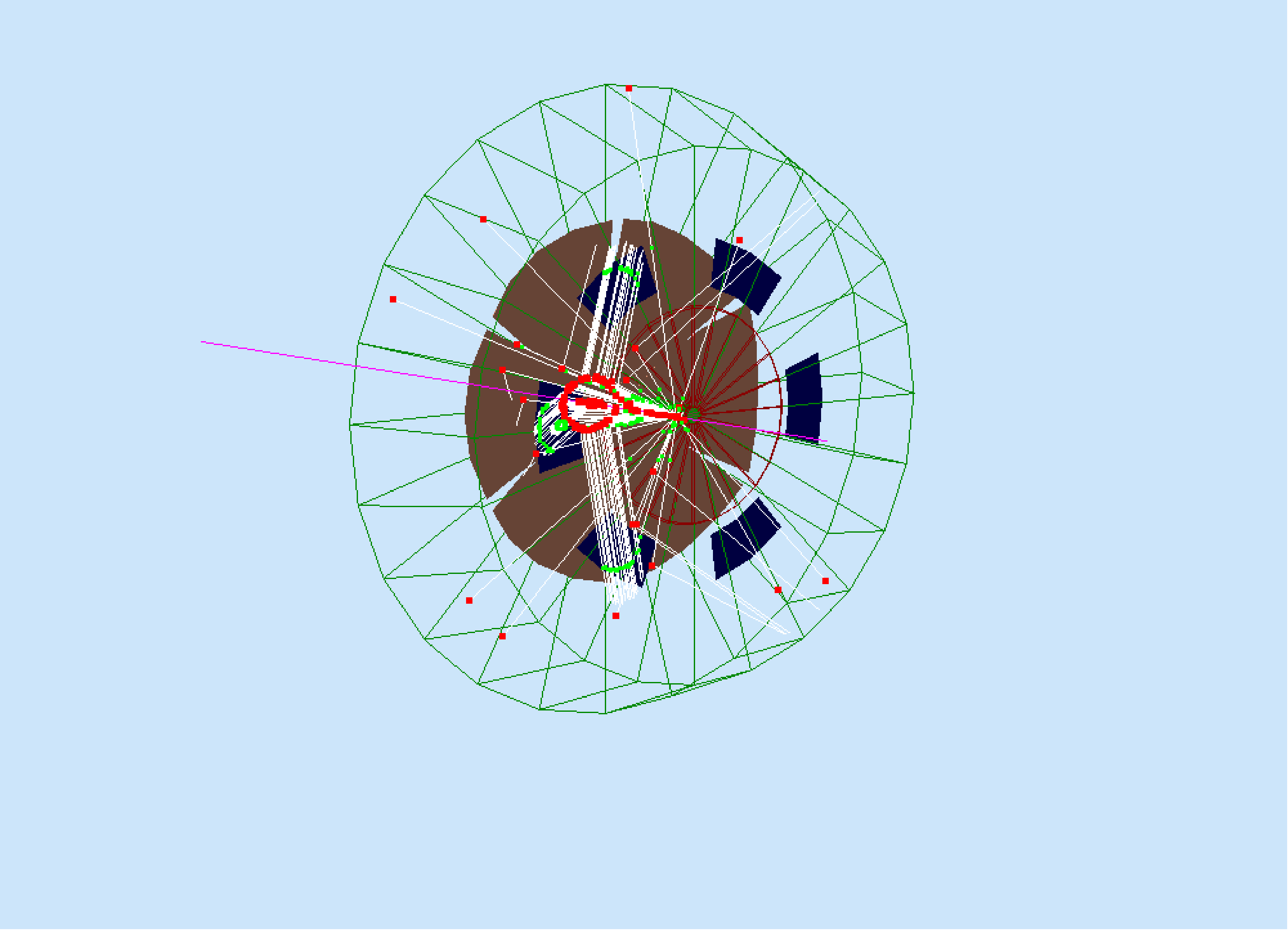


Field uncertanty – new hybrid



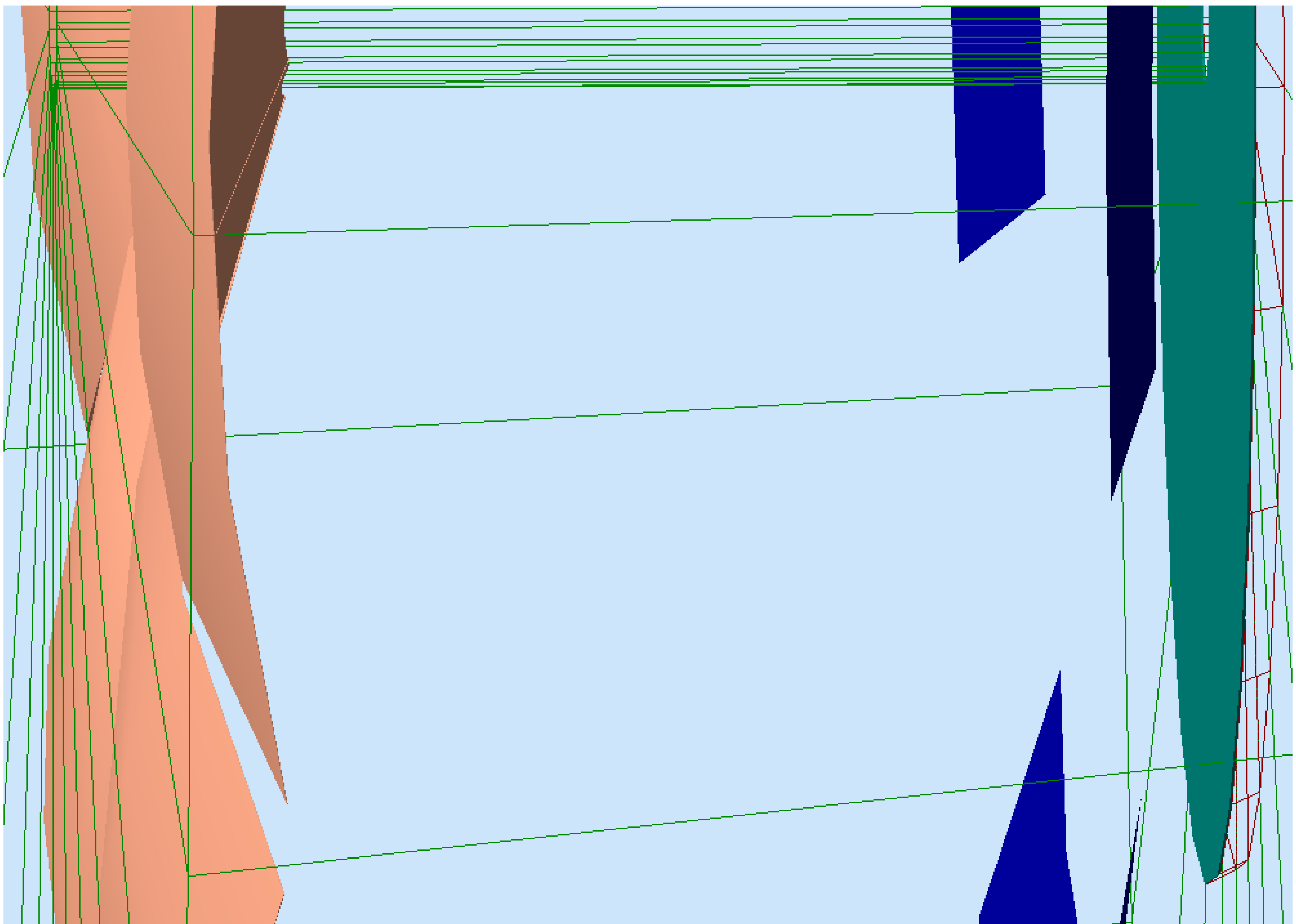


Rayleigh scattering



Using Marco's Parameters for aerogel

Acrylic shield

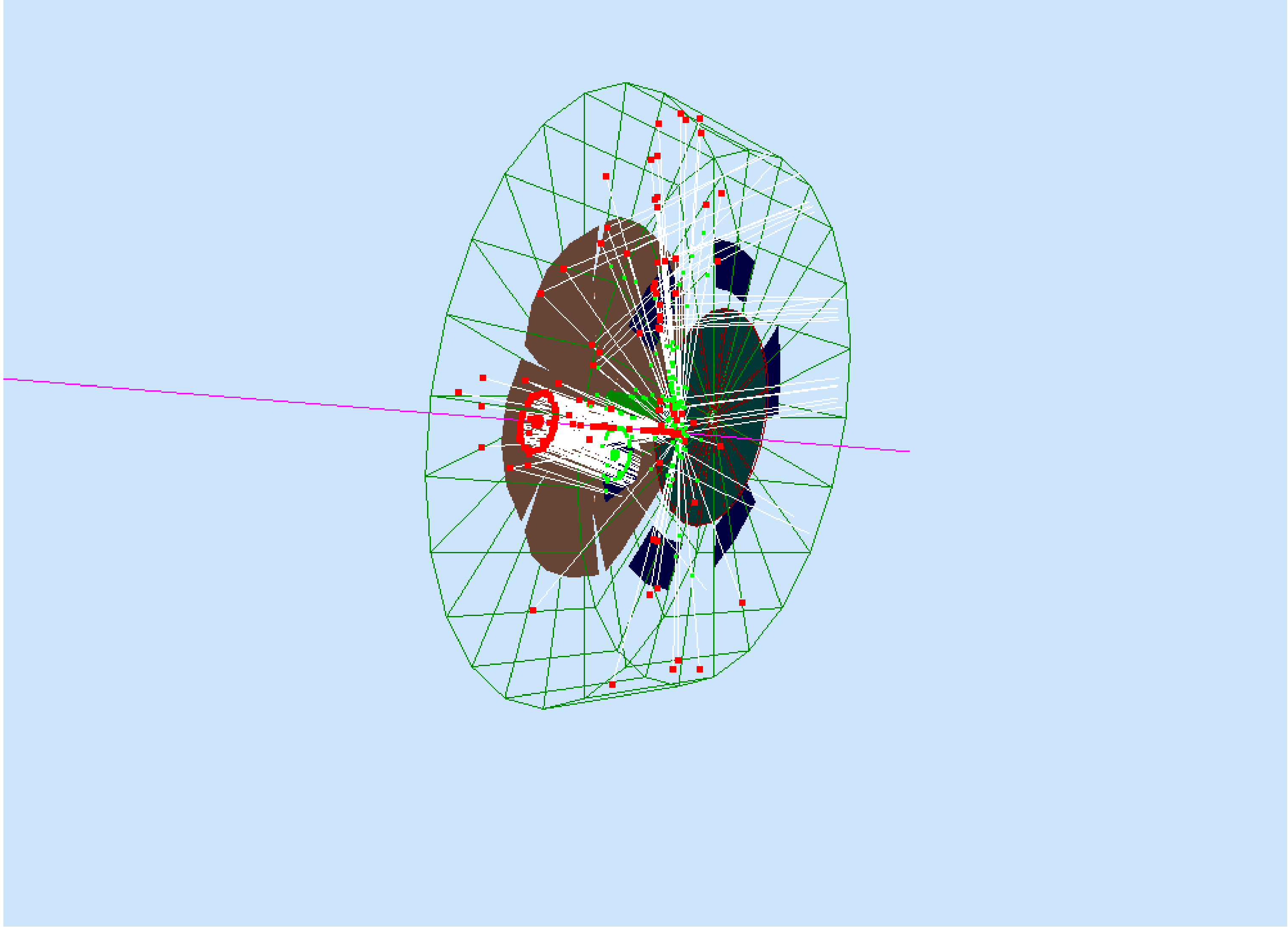


An acrylic shield
has been added
In front of the
Aerogel

Thickness 3 mm

Absorption length
About 5 m above
320 nm, about mm
Below 320 nm

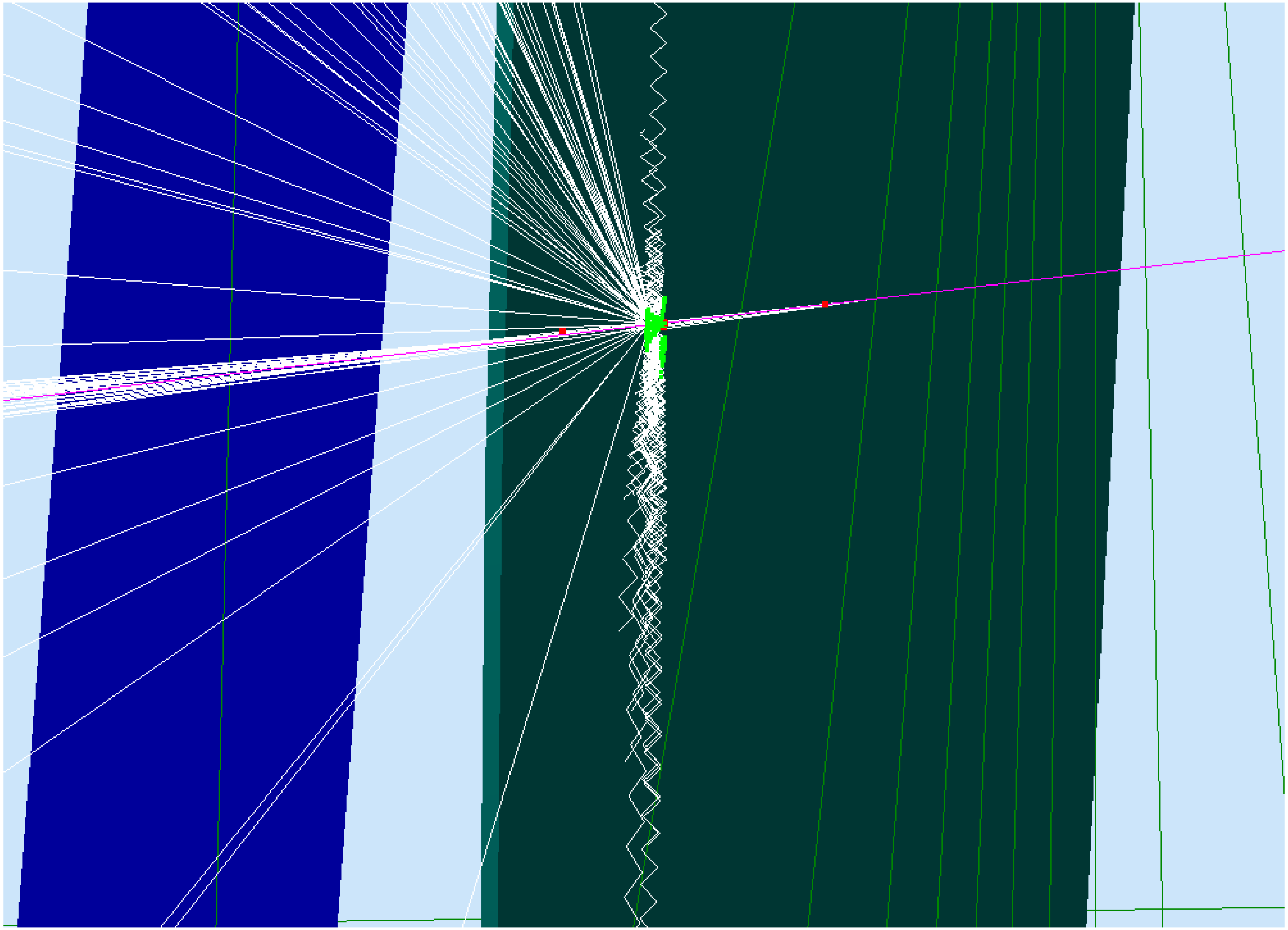
Acrylic shield



Additional background comes from cherenkov photons produced in the acrylic shield

Not all the photons are Internally reflected for tracks angles above 12°

Acrylic shield



Not all the photons are Internally reflected for tracks angles above 12°

To do Next

- Continue the on Rayleigh scattering

- Find the number of sigma of separation as a function of the polar angle